

REMARKS

This is intended as a full and complete response to the Office Action dated October 9, 2008, having an original response due date of January 9, 2009, extended three months to be due on April 9, 2009.

Claim Rejections Under 35 U.S.C. § 112

Claims 16, 19, 22, and 25-28 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

This rejection is respectfully traversed. In an embodiment of the present invention, the specific gravity of an unreinforced structural foam molding is in the range of from 0.2 to 0.8. Surely this range is not so great that the Applicants did not contemplate foams with specific gravities ranging therebetween, including a specific gravity endpoint of 0.4. For at least this reason, withdrawal of the rejection is requested.

Claims 25-27 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

This rejection is also respectfully traversed. In an embodiment of the invention, conventional catalysts, such as tertiary amine catalysts, can be eliminated from the reaction system.

Claims 25-27 stand rejected under 35 U.S.C. § 112, second paragraph, as failing to particularly point out and distinctly claim the subject matter that the applicant regards as the invention. In view of the amendments to claims 25-27, withdrawal of this ground of rejection is requested.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-7, 10-16, 19, and 21-28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bodnar (5,143,945) alone.

As amended, claim 1 calls for a B component that includes an organic isocyanate-reactive component comprising at least fifty (50) percent by weight, based on the total weight of the organic isocyanate-reactive component, of a organic polyol having at least one aliphatic tertiary amine group, a number averaged hydroxyl equivalent weight of greater than 70 to less than 450, and a number averaged molecular weight of between 240 and 500. The B component of claim 1

also recites an isocyanate-reactive foaming agent including water and optionally a carboxylic acid, and an additive component.

Pursuant to an embodiment of the present invention, structural moldings can be made without reinforcing materials, such as fibrous materials, that have the stiffness and toughness associated with foams that do contain such reinforcing materials. *See, e.g.*, US 2004/0192800 A1 at para. [0070]-[0071]. For example, the break strain to yield strain is a measure of flexural toughness, and according to an embodiment of the present invention, this ratio is at least 1.25, but more preferably is at least 1.35. Thus, the Applicants's moldings are stiff and tough; not brittle.

Without being bound by theory, the claimed tertiary amine-initiated polyols are believed to be important to the observed foam toughness. For example, referring to Table 1 of the '800 publication, the primary polyol used in the comparative example is a propoxylated glycerol having a hydroxyl number of 650 whereas the primary polyol used in example 1 is a propoxylated triethanolamine having a hydroxyl number of 635. *See* 2004/0192800 at [0083]-[0084]. Thus, the two polyols are similar in hydroxyl number and functionality. Interestingly, the foams of the Applicants's examples demonstrated a relatively high break strain (and toughness) as compared to the comparative example. *See, e.g., Id.* at [0076]-[0078]. For example, the flexural yield and break strains for example 1 were 6.2% and 8.6% respectively, whereas the flexural yield and break strains for the comparative example were 6.2% and 6.8 % respectively. Moreover, three of examples 2-5 did not break below the 10% strain limit. Thus, foams made with a lower molecular weight tertiary amine-initiated polyol were tougher than the foam made with a lower molecular weight glycerol-initiated polyol.

It is respectfully submitted that Bodnar does not disclose or suggest any such claimed unreinforced structural foam or tertiary amine-initiated polyol. For example, Bodnar's foams are polyurethane-polyisocyanurate (PIR) foams. PIR foams tend to be brittle; not tough. Thus, there is no reason to expect that Bodnar's PIR foams have the same characteristics as foams made according to an embodiment of the present invention.

Additionally, Bodnar discloses two types of polyols, "conventional polymeric polyols" and "a most preferred class of so-called crude polyester polyols." 6:5-67. Bodnar provides a broad range of molecular weights to encompass both types of polyols. *Id.* For example, Bodnar states that the low end of the molecular weight range is "unusually low for the more conventional

polymeric polyols" and that the lower limit is recited to include the crude polyester polyols. 6:5-16. Bodnar then goes on to state that conventional polymeric polyols have a molecular weight of about 1,000 to about 12,000, whereas the crude polyester polyols have molecular weight from about 225 to about 5000. 6:17-19 and 6:58 *et seq.* Thus, taking Bodnar's teachings as a whole, it is submitted that the only lower molecular weight polyols contemplated by Bodnar are his crude polyester polyols. But the crude polyester polyols are not initiated with a tertiary amine. *See, e.g.,* 7:23-35. Thus, Bodnar does not teach or suggest a lower molecular weight polyol having a tertiary amine group.

Even if Bodnar did taught or suggest a lower molecular weight conventional polymeric polyol, which he does not, Bodnar still does not teach or suggest all of the Applicant's invention. For example, a tertiary-amine containing organic polyol of the present invention may be made by the sequential addition of ethylene oxide onto an amine initiator that is followed by the addition of propylene oxide such that there are at least two oxyethylene units and greater than 1.5 ether linkages. *See, e.g.,* US 2004/0192800 paragraphs [0036]-[0039]. Furthermore, the hydroxyl groups are predominantly secondary aliphatic alcohol groups. *Id.* In contrast, to the extent that Bodnar discloses conventional polyols that are formed from the alkoxylation of an amine—he limits is discussion to propyleneoxy-polyethylene capped polyols. 6:43-50. Thus, Bodnar neither discloses nor suggests adding ethylene oxide to an amine initiator followed by the addition of propylene oxide. In an embodiment of the present invention, is the propylene oxide groups of the amine-initiated polyol that contribute to the predominantly secondary aliphatic alcohol groups, which do not occur with an oxyethylene end cap.

Furthermore, in some embodiments of the present invention, the blowing agent includes a carboxylic acid. Although Bodnar's blowing agent includes an organic carboxylic acid, the proportion of carboxylic acid is critical to obtain the desired blowing action. 3:38-42. Specifically, the relationship between the carboxylic acid and the total equivalents of tertiary amine in the reaction mixture is critical; the equivalents of carboxylic acid are greater than the total equivalents of tertiary amine. 4:40-48. For instance, the "reaction mixture should comprise a proportion of equivalents of carboxylic acid to total equivalents of tertiary amine of at least about 1.2:1...and most preferably at least about 2.5:1." 4: 40-48.

In contrast, the B component of claim 1 includes at least fifty (50) percent by weight of a tertiary amine. Without limiting embodiments of the present invention, if the B-side of claim 1

also included the optional carboxylic acid in addition to water and an additive component, these three together could not exceed 50 % by weight of the B component. Thus, the percent by weight of the carboxylic acid must be less than that of the tertiary amine. Because Bodnar teaches away, such a reaction system is not obvious over Bodnar alone.

Under an analysis similar to that above, independent claims 7 and 16 and claims dependent thereon are also not obvious in view of Bodnar alone.

Conclusion

Having addressed all issues set out in the Office action, Applicant respectfully submits that the claims are in condition for allowance and respectfully requests that the claims be allowed.

Respectfully submitted,

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Date



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